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EVALUATION OF THE SEED AND CONE
INSECT SITUATION IN THE LAKE STATES
SEED PRODUCTION AREAS - 1968

R. F. Fowler and G. W. Erickson

ABSTRACT

Cone samples were collected from fifteen red pine seed production areas in the Lake States. An average of 25 percent of the cones were infested by seed and cone insects, with a range from 2 to 92% for individual seed production areas. The red pine cone beetle was the most important cause of damage.

On the basis of conelets collected the potential red pine cone crop for 1969 ranges from 4 to 320 bushels of cones per area.

Only one white spruce seed production area of 4 examined produced a cone crop this year and 16% of the cones were insect damaged.

INTRODUCTION

Each year since 1962 various seed production areas (SPA/s) on the National Forests in the Lake States have been sampled for seed and cone insects. The sampling has not necessarily been conducted in the same areas each year. The 1968 results from 15 red pine (Pinus resinosa Ait.) SPA's and one white spruce (Picea glauca (Moench) Voss) SPA are presented here. Sampling of white spruce cones began in 1967.

The purpose of the survey is to provide the land manager with estimates of losses caused by insects and cone production in these areas.

This is a cooperative project involving Region 9 of the National Forest System, North Central Forest Experiment Station and St. Paul Field Office of State and Private Forestry.

METHODS

The sampling procedure was designed by the North Central Forest Experiment Station staff. Briefly it consists of a random selection of 15 sample trees in each seed production areas. One whorl of branches is cut from mid-crown of each tree. All one- and two-year-old cones are picked from the branches, bagged together and tagged for identification. The cones are sent to the St. Paul Field Office for examination and identification of cause of damage.

Spruce cones are collected in the upper crown since cones do not occur at the mid-crown level.

RESULTS AND DISCUSSION

Red Pine Cone Damage

Five species of seed and cone insects damaged an average of 25% of the cones, with a range of variation from 2% to 92%.

Cone mortality is caused by the red pine cone beetle, Conophthorus resinosae Hopk., and two cone worms, Dioryctria disclusa Heinrich and Eucosma monitorana Heinrich. No seed is obtained from damaged cones. The damage caused by these insects and an estimated cone loss (in bushels) is shown in Table I. The red pine cone beetle was the primary cause of damage in 14 of the 15 areas and the red pine cone worm (D. disclusa) was the primary cause

in the Birch Hill SPA.

Seed or cone damage is caused by two insects. Laspeyresia toreuta Grote, larvae consume four to ten seeds each and rarely more than two larvae are found per cone. (Red pine cones average 40 seeds per cone). Rubsaamenia spp., larvae usually feed on cone scales, but when larvae are numerous some seed damage occurs. The percentage of cones containing these insects plus other cone damage is presented in Table II.

White Spruce Cone Damage

White spruce cones were collected from the Oconto SPA on the Nicolet National Forest. The crop was very small, averaging six cones per sample whorl. Sixteen percent of the 242 cones examined were damaged as follows:

<u>Dioryctria</u> spp.	2%
<u>Laspeyresia</u> spp.	12%
Other	2%

Dioryctria larvae destroy the entire cone. Laspeyresia does not kill the entire cone; however, seed losses were not estimated.

Since spruce cones mature in one year, no conelets are collected and estimates for the following year are not possible.

Estimation Cone Crops

Though the current state of knowledge does not allow prediction of insect damage, the current cone crop and the potential crop can be estimated from the whorl samples collected for insect damage estimates. Research has shown that in red pine seed production areas the mid-crown branch whorl contains about 5% of the cones on a tree (Mattson 1967). The number of sound cones or conelets on a sample whorl times twenty gives the total number of cones or conelets per tree. Multiplying this total by the number of trees in the SPA gives the potential cone crop. There are about 1500 red pine cones per bushel. The number of estimated bushels of cones per SPA for 1968 (Table I) and the predicted crop for 1969 (Table III) were obtained by this method.

The formula is as follows:

$$\text{No. Cones on sample whorl} \times 20 \times \frac{\text{No. trees in SPA}}{1500} = \text{Bushels of Cones per SPA}$$

REFERENCE

Mattson, W. J. 1967. Impact of insects in seed production areas - 1967. North Central Forest Experiment Station. Unpublished report.

TABLE I. CONES DESTROYED BY CONE INSECTS IN RED PINE SEED PRODUCTION AREAS - 1968

Seed Production Area	Total No. Cones Sampled	Cones Destroyed By			Total %	Ave. No. Cones Mid-crown Whorl	Estimated Cone Crop Bushels	
		<u>Conophthorus</u> <u>resinosae</u> %	<u>Dioryctria</u> <u>disclusa</u> %	<u>Eucosma</u> <u>monitorana</u> %			Total Damage	
CHEQUAMEGON N.F. Bearsdale Springs	692	16	<1	1	17	46	245	42
NICOLET N.F. Farr Lake	245	18	4	1	23	16	160	37
Cary Dam	590	14	1	<1	15	39	260	39
Rosen Dam	635	3	<1	<1	3	42	213	6
CHIPPEWA N.F. Birch Hill	458	12	24	9	45	31	351	158
Portage Lake	12	17	0	0	17	0.8	15	3
SUPERIOR N.F. Isabella R.	267	<1	0	0	0	18	168	0
OTTAWA N.F. Norway Lake	396	17	1	2	20	26	163	33
HIAWATHA N.F. Ogontz R.	736	15	<1	2	17	49	523	89
Black Creek	258	13	3	<1	16	17	147	24
HURON N.F. Loud Dam	54	78	4	4	86	4	21	18
Mack Lake	235	20	1	1	22	16	32	7
Hickey Creek	118	10	0	<1	10	8	53	5
Highway 144	250	13	<1	<1	13	17	204	27
Canoe Chapel	242	21	<1	1	22	16	149	33
REGIONAL AVERAGE	346	14	3	2	19	23	198	38

TABLE II. PARTIALLY DAMAGED CONES IN RED PINE SEED PRODUCTION AREAS - 1968

Seed Production Area	Total No. Cones Sampled	<u>Laspeyresia</u> <u>toreuta</u> %	<u>Rubsaamenia</u> <u>spp.</u> %	Other %	Total %
CHEQUAMEGON N.F. Bearsdale Springs	692	<1	<1	<1	0
NICOLET N.F. Farr Lake	245	11	6	0	17
Cary Dam	590	3	4	<1	7
Rosen Dam	635	1	<1	<1	1
CHIPPEWA N.F. Birch Hill	458	<1	5	4	9
Portage Lake	12	8	0	0	8
SUPERIOR N.F. Isabella R.	267	1	1	0	2
OTTAWA N.F. Norway Lake	396	<1	5	<1	5
HIAWATHA N.F. Ogontz R.	736	<1	2	2	4
Black Creek	258	2	3	0	5
HURON N.F. Loud Dam	54	0	4	2	6
Mack Lake	235	1	8	0	9
Hickey Creek	118	<1	4	0	4
Highway 144	250	2	<1	0	2
Canoe Chapel	242	1	2	0	3
REGIONAL AVERAGE	346	2	3	1	6

TABLE III. CONE CROP OUTLOOK FOR 1969 IN RED PINE SEED
PRODUCTION AREAS, AS DETERMINED FROM CONELETS
IN THE FALL OF 1968

Seed Produc- tion Area	Mean # of Sound Cone- lets/Branch Whorl	Mean # Conelets/tree	Approx. # of trees in SPA	Approx. Potential # of bushels of cones
CHEQUAMEGON N.F. Bearsdale Springs	32	640	400	171
NICOLET N.F. Farr Lake	19	380	750	190
Cary Dam	30	600	500*	200
Rosen Dam	0.6	12	500	4
CHIPPEWA N.F. Birch Hill	27	540	850	306
Portage Lake	2	40	1,400	37
SUPERIOR N.F. Isabella R.	6	120	700	56
OTTAWA N.F. Norway Lake	15	300	470	94
HIAWATHA N.F. Ogontz R.	30	600	800	320
Black Creek	34	680	650	295
HURON N.F. Loud Dam	2	40	400	11
Mack Lake	17	340	150	34
Hickey Creek	9	180	500	60
Highway 144	11	220	900	132
Canoe Chapel	9	180	700	84

*Estimated as exact number unknown